Appl. No.: 10/707,927
Amdt. Dated: 1/8/2006
Reply to Office action of: 10/28/2005

AMENDMENTS TO THE DRAWINGS:

The attached sheet(s) of drawings includes changes to Figure1 and 2 and the addition of new Figure 4. In Figures 1 and 2 the previously omitted element 6 has been added. New Figure 4 illustrates the circuit board substrate and conductive tracks disclosed in the specification but previously omitted from the drawings.

Attachment: Replacement Sheet(s) showing corrected Figures 1 and 2 and original Figure 3 with new Figure 4
Annotated Sheet(s) Showing Changes to Figures 1 and 2 and the addition of new Figure 4

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REMARKS/ARGUMENTS

In the specification, the paragraphs [0019], [0020], and [0021] have been amended to correct minor editorial problems. The new paragraph [0018.1] added after paragraph [0018] discusses in general terms the new Figure 4 required by the Examiner.

In amended Figures 1 and 2, the previously omitted element numeral 6 has been added. In new Figure 4 the substrate and conductive tracks of the printed circuit board have been clearly illustrated as required by the Examiner.

Claims 1 – 6 remain in this application. Claims 1 – 5 have been amended to overcome the Examiner's objections and rejections under 35 U.S.C. 112 and 35 U.S.C. 101 and to correct minor editorial problems. Support for these amendments may be found in the original specification and drawings. New Claim 6 has been added to remove the alternative language in original Claim 2. Thus, new Claim 6 is one of the two alternatives of original Claim 2. Support for new Claim 6 may be found, for example, in original Claim 2.

No new matter has been introduced by these amendments.

Claims 1 – 5 were rejected under 35 U.S.C. 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner states:

> a) Many phrases such as: "the substrate" (claim 1, line 2), "the production" (claim 1, line 3), "the undercutting" (claim 1, lines 4 – 5), "the printed circuit's support substrate" (claim 1, lines 5 – 6), "the printed circuit" (claim 1, line 7), "the metallic material conductive tracks" (claim 1, line 8), "the milled surface" (claim 1, line 9), "the conductive layer's thickness) (claim 3, line 2), the thickness conductive layer" (claim 4, line 2), "the conductive layer material" (claim 5, line 2), and etc. lacks of antecedent basis.
>
> b) The phrase "the printed circuit" (claim 1, line 7) is unclear whether it is as same as "the substrate of printed circuit boards" recited in lines 2 – 3.
>
> c) The phrase: "up to a value of 180°" (claim 1, line 7) contains term "up to" which renders the claim indefinite. Because the term "up to" is not defined by the claim, and the specification does not provide a standard for

> ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention.
>
> d) The preamble of claims 3 – 5 is objected to because claims directed to method invention however the preamble of claims 3 – 5 directed to product (see claims 3 – 5, line 1) which make the scope of the claims unclear. It's suggest that claims 3 – 5 should be amended to read on method invention similar to that as clearly represented in claims 1 – 2, line 1.

Applicant respectfully traverses this rejection. The present claimsascurrently amended remove the indefinite language as well as present all of the claims as directed to a method. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

Claims 3 – 5 were rejected under 35 U.S.C. 101 as being directed to two separate classifications such as process of making and product made. See MPEP § 608.01(f).

Applicant respectfully traverses this rejection. The present claims as amended present only process of making claims making this rejection moot. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

Claims 1 – 2 were rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,925,298 to Walles et al. Specifically, the Examiner states:

> Regarding claim 1, Walles et al disclose a multiple-milling process for manufacturing printed circuit, constituted by a process for preparing a substrate of printed circuit boards (10) for the production of bending areas (18), characterized by consisting of: performing an undercutting in multiple parallel strips (See Figs 2A-B) on printed circuit's support substrate by means of a milling tool (See Col. 2, lines 37-38) allowing for a subsequent bending of a printed circuit up to a value of 180° without deteriorating a metallic material conductive tracks adhered to the printed circuit substrate on the side opposite a milled surface (see Fig. 6).
>
> Regarding claim 2, Walles et al disclose the milling tool is a mill comprising a roll provided with multiple polishing strips or teeth on its surface (see Col. 2, lines 37-38 and Figs. 2A-B).

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Applicant respectfully traverses this rejection. The key to Applicants' invention is the method of under-cutting of multiple parallel tracks in one surface of a circuit board substrate in a single operation. This allows for more time and cost effective production of circuit boards adaptable to bending or folding into up to a U-shape without damaging the electrically conductive tracked adhered to said circuit boards.

A fair reading of Walles et al. reference discloses a process for under-cutting a circuit board substrate and subsequently bending said circuit board by using a single under-cut or a series of parallel under-cuts produced one at a time by a single-point cutting device such as a carbide endmill or a fly cutter tool (see for example Col. 2, lines 36 – 38). Contrary to the Examiner's argument above, this reference specifically teaches the use of a single single-point cutting tool (see for example the commercially available endmill of Exhibit A and the commercially available fly cutter of Exhibit B), specifically, "A groove 16 is cut into circuit board 10 to form a bend region 18. Groove 16 is preferably machined conventionally by using a carbide endmill, fly cutter, or similar tool." Clearly, the reference specifically teaches one groove 16 or each of multiple grooves 16 being cut independently using a single-point cutting tool and specifically referred to in the singular. Clearly, the Walles et. al. reference does not disclose, teach, or suggest the use of a single multiple-point cutting tool of Applicant's claimed invention.

Claims 3 – 5 were rejected under 35 U.S.C. 102(b) as being anticipated by Walles et al. Specifically, the Examiner states:

> Walles et al disclose product by process of claims 3 – 5 including a conductive layer such as copper (see, Col. 2, line 26 – 27) having a thickness in ranges between 65 – 400 microns (See Fig. 1 and the discussion at Col. 2, lines 53 – 54). Note wherein the thickness of bending area or region being below 25 mils with 5 layers.

Applicant respectfully traverses this rejection. The key to Applicants' invention, as mentioned above, is the method of under-cutting of multiple parallel tracks in one surface of a circuit board substrate in a single operation. This allows for more time and cost effective production of circuit boards adaptable to bending or folding into up to a U-shape without damaging the electrically conductive tracked adhered to said circuit boards.

A fair reading of Walles et al. reference, as mentioned above, discloses a process for under-cutting a circuit board substrate and subsequently bending said circuit board by

using a single under-cut or a series of parallel under-cuts produced one at a time by a single-point cutting device such as a carbide endmill or a fly cutter tool (see for example Col. 2, lines 36 – 38). This reference specifically teaches the use of a single single-point cutting tool (see for example the commercially available endmill of Exhibit A and the commercially available fly cutter of Exhibit B), specifically, "A groove 16 is cut into circuit board 10 to form a bend region 18. Groove 16 is preferably machined conventionally by using a carbide endmill, fly cutter, or similar tool." Clearly, the reference specifically teaches one groove 16 or each of multiple grooves 16 being cut independently using a single-point cutting tool and specifically referred to in the singular. The fact that the reference discloses the use of commonly known copper as the conductive material does not overcome the failing of the Walles et. al. reference to teach the cutting of multiple parallel grooves simultaneously with a single tool. Contrary to the Examiner's assertion the reference at Col. 2, lines 53 – 54 and Figures 2A and 2B do not address themselves to the conductive track thickness at all. Instead these references are directed specifically to the thickness of the circuit board substrate in the under-cut regions. Clearly, the Walles et. al. reference does not disclose, teach, or suggest the use of a single multiple-point cutting tool of Applicant's claimed invention for cutting a bending region on a circuit board having electrically conductive tracks of copper metal having a thickness of from about 65 to about 400 microns.

In light of Applicant's continuing obligations under Rule 56 kindly find attached an Invention Disclosure Statement Form (page 1 only) and copies of the cited the Spanish patents referenced in the body of the application and a copy of the reference found relevant in the International Search Report a copy of which is also attached for the Examiner's convenience. Applicant has no English translations of these references.

Applicants' note the prior art made of record but not relied upon by the Examiner. Since this art was not the basis of a rejection Applicants' make no further comment regarding this prior art.

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In view of the remarks herein, and the amendments hereto, it is submitted that this application is in condition for allowance, and such action and issuance of a timely Notice of Allowance is respectfully solicited.

Respectfully submitted,

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Annotated Sheet Showing Changes

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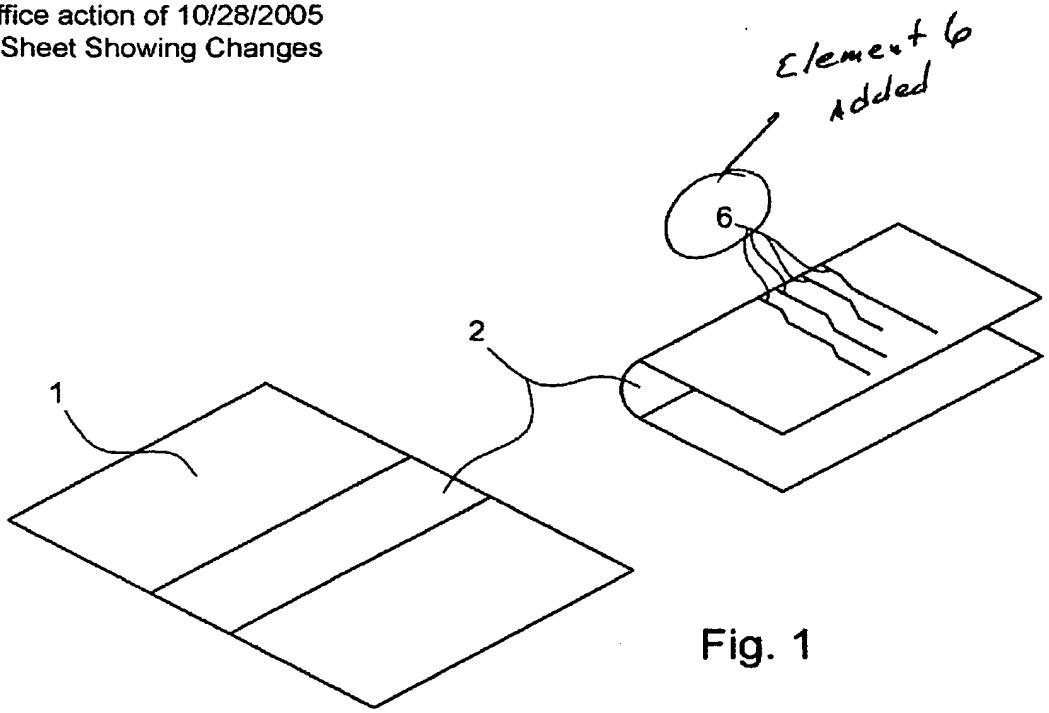

Fig. 1

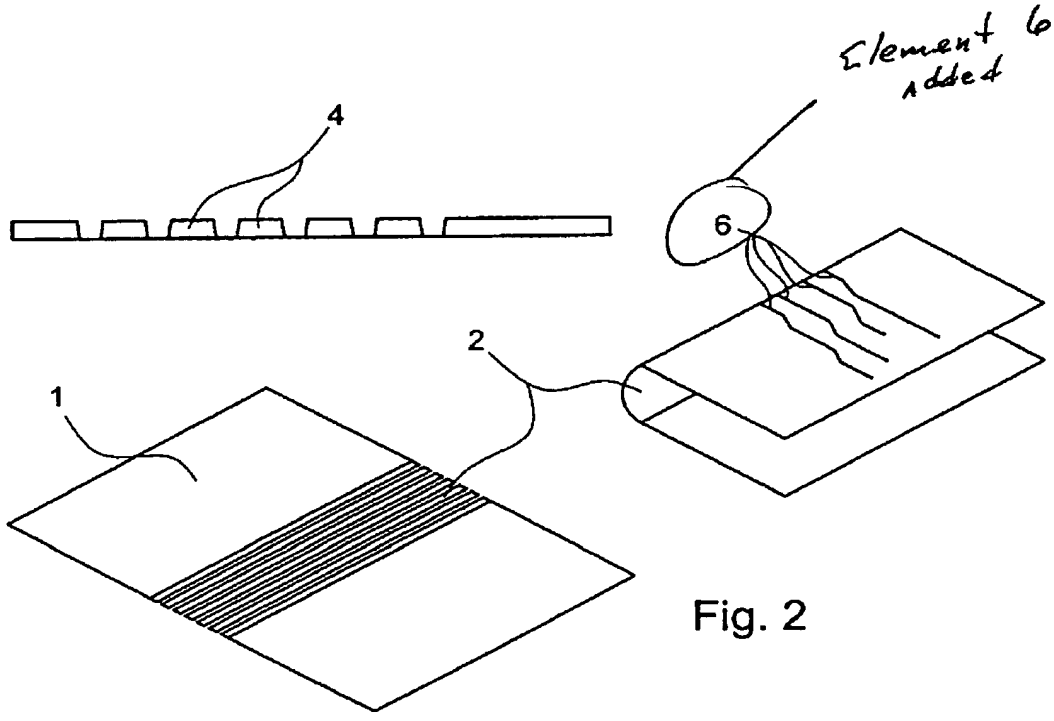

Fig. 2

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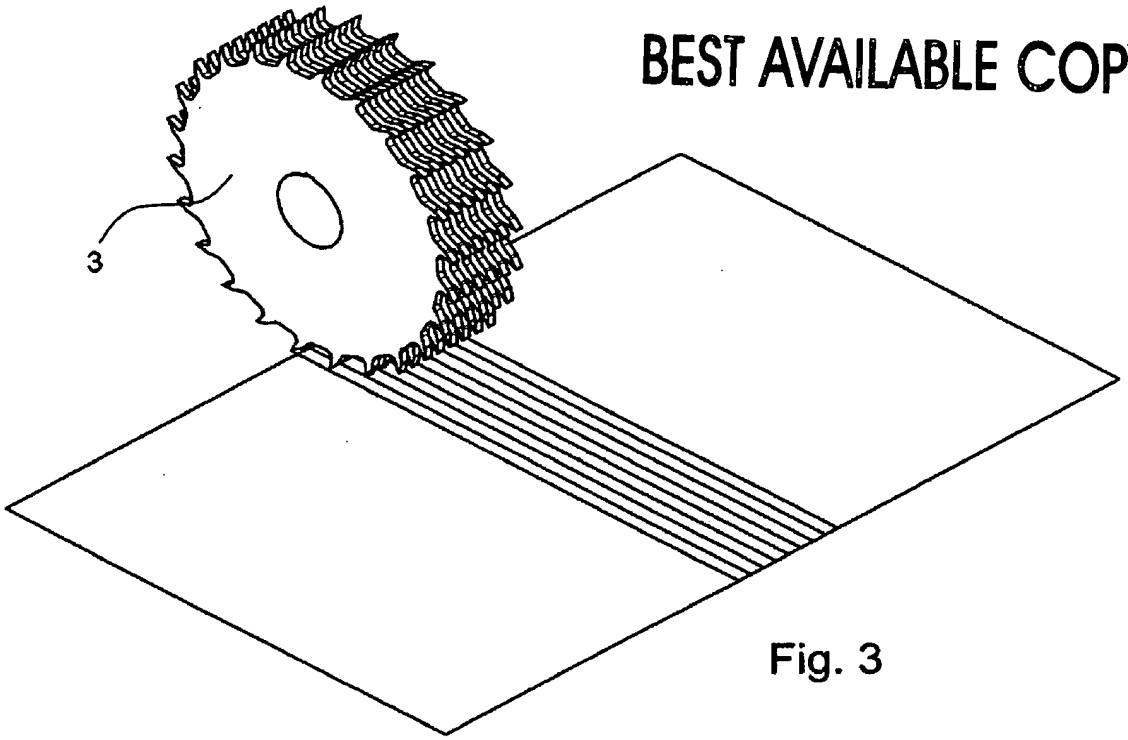

Fig. 3

New figure showing cross-section of circuit board substrate and conductive tracks

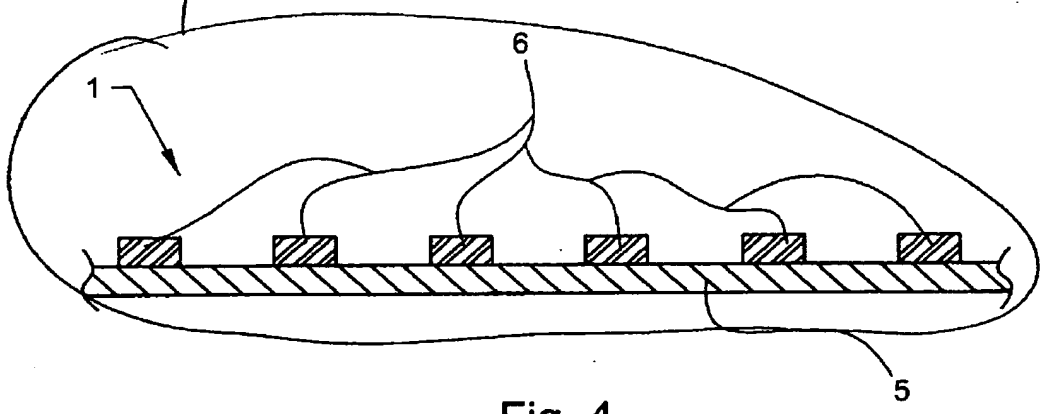

Fig. 4